

support of intelligent work stations and system security. The study provides a total monthly cost estimate for these miscellaneous ongoing activities based on estimates of annual labor hours and direct labor rates.

- *Ongoing Helpdesk Costs.* This is the total monthly labor cost of the LSP Helpdesk. The cost is based on the number of hours per month required by the Information Systems organization to staff the Helpdesk and the associated direct labor rate.
- *Ongoing Remote Access Facility Costs.* Remote access facilities costs include capital costs and operating expenses for the plant necessary to provide LSP access to SWBT OSS. The plant includes modems, routers, computers, voice response units and others. The total plant required for remote access facilities is identified, and total monthly capital costs and operating expenses for the plant are computed. This amount is divided by the capacity (in ports) of remote access facilities to arrive at a monthly plant-related cost per port.

In addition to the plant-related cost per port, a separate estimate is developed of the additional labor costs to support the remote access facilities. This is based on an estimate of the annual hours required for support and direct labor rates. These additional labor-related costs are divided by port capacity.

In summary, the OSS cost study provides the *total start-up costs* to provide LSP access to OSS and the *total monthly costs* to support LSP access. In addition, *monthly costs* for the LSP remote access facility are provided on a *per port basis*.

## Capital Costs

### 8.1 Definition of Capital Costs

Capital costs include *depreciation expense*, the *cost of money* and *income taxes*.

- *Depreciation* is the annual expense of recovering the original construction cost of telephone plant, less any net salvage, over the service life of the plant. Depreciation is computed for each plant account based upon the prospective lives and expected net salvages.
- *Cost of money* is the annual return required on investor supplied capital used to construct telephone plant. The return requirement includes the prospective costs of debt and equity, weighted by the proportion of debt and equity anticipated in Southwestern Bell's forward-looking capital structure.
- *Income taxes* represent the amount of income taxes which would be owed on taxable income from revenues sufficient to cover the cost of equity after taxes.

When revenues from offering a network element are sufficient to recover its operating expenses and capital costs, revenues are said to recover all costs, including the costs of capital recovery and the return required on investor capital.

### 8.2 Capital Cost Calculation

Figure 8.1 provides a simplified example of capital cost calculations for a single item of telephone plant with a five year service life. The results of the calculations shown on the last three lines are factors which are multiplied times the original cost of plant or gross investment to compute capital costs.

- *Plant investment and net salvage.* The original cost of telephone plant or *plant investment* is incurred at the beginning of the plant's *service life*. At the end of the service life, the Company may realize some value, *gross salvage*, in disposing of the plant. This amount is reduced by any *cost of removal*, yielding a *net salvage* value. Service lives and net salvages expressed as a percentage of plant investment are estimated annually for each plant account based on the forward-looking lives and salvages expected for telephone equipment. They vary somewhat among the states in which Southwestern Bell operates.
- *Depreciation rate, depreciation expense, depreciation reserve and net investment.* The *depreciation rate* equals 100% of plant investment less the percentage net salvage, divided by the service life. *Depreciation expense* is the product of the depreciation rate and plant investment. Depreciation rates vary among plant accounts.

Over the life of the plant, depreciation is accrued in a reserve reflecting the gradual recovery of the initial capital investment. The difference between plant investment and the *depreciation reserve* equals the *net investment*. A annual return must be earned on the remaining investor capital in the plant.

- *Costs of debt and equity, debt ratio and the cost of money.* Funds for telephone plant construction come from depreciation accruals or cash from current operations used to recover prior plant investment, capital from the issuance of bonds and stock, and retained earnings. (As described below, deferred income taxes also are used to fund capital investment.)

Debt capital has an interest payment obligation referred to as the *cost of debt*, and equity capital from stocks and retained earnings has a return requirement or *cost of equity*. The mix of debt and equity capital, measured by the *debt ratio* or ratio of debt to debt and equity capital, determines the composite *cost of money*. Southwestern Bell estimates its forward-looking costs of debt and equity and debt ratio to determine the cost of money used in the unbundled network element cost studies.

The annual cost of money equals the cost of money percentage applied to the net investment. As the net investment declines, the cost of money or return requirement also declines.

- *Income tax rate, taxable income required and income tax expense.* The *income tax rate* is the effective federal and state income tax rate. In order to realize income after taxes sufficient to cover the cost of equity requires a level of *taxable income* equal to the cost of equity divided by  $(1 - \text{income tax rate})$ .<sup>14</sup> The *income tax expense* is the income tax rate times the taxable income requirement.

With the exception of depreciation expense, the capital costs vary each year as net investment in telephone plant declines. In order to "levelize" the series of capital costs, they are brought to the present using *present worth factors* computed at the cost of money, and then spread back over the service life using an *annuity factor*.<sup>15</sup> After these steps are completed, the levelized capital costs are divided by the original plant cost to compute levelized capital cost factors. These factors are then used in ACES to compute capital costs for each type of plant.

Capital cost calculations actually are more complicated than those shown in Figure 8.1. Several additional factors are take into consideration. For example,

- *Effects of accelerated tax depreciation.* The use of accelerated tax depreciation and the normalization of deferred income taxes reduces investor-supplied capital in telephone plant. Recognizing accelerated tax depreciation lowers the cost of money and associated income taxes.

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<sup>14</sup> Since interest expense is tax deductible, there is no need to "gross up" the cost of debt to a pre-taxable income amount.

<sup>15</sup> Capital costs also can be computed over planning periods less than the service life by computing the present worth and annuity of capital costs for shorter periods of time.

- *Multiple units of plant, survivor curves and method of depreciation.* Unlike the earlier example, telephone plant normally consists of multiple units of plant placed during a year, and these units usually have different survival patterns, with some retiring before others. Also, the plant placed in a single year is subject to equal life group or vintage group depreciation. These factors require more refined modeling of the timing of plant investment, retirements, annual depreciation and net investment.

Southwestern Bell uses the CAPCOST model to reflect these and other factors in computing capital costs. CAPCOST is licensed by Bellcore to local exchange carriers and has been in use in the telephone industry for many years. The variables described above are the key input variables to the CAPCOST model.

Figure 8.1 - Illustrative.

	Line	Factor	End of Year						Source
			0	1	2	3	4	5	
Plant Investment	1		\$ 1,000						Investment Study
Gross Salvage	2							\$ 200	Engineering
Cost of Removal	3							\$ 100	Engineering
Net Salvage	4							\$ 100	Ln. 2 - Ln. 3
Depreciation Rate	5	18.00%							(100% - NS%) / S.L.
Depreciation Expense	6			\$ 180	\$ 180	\$ 180	\$ 180	\$ 180	Ln. 1 X Ln. 5
Depreciation Reserve	7		\$ -	\$ 180	\$ 360	\$ 540	\$ 720	\$ -	Cumulative Ln. 6
Net Investment	8		\$ 1,000	\$ 820	\$ 640	\$ 460	\$ 280	\$ -	Ln. 1 - Ln. 7
Cost of Debt	9	8.0%							Finance
Cost of Equity	10	12.0%							Finance
Debt Ratio	11	50.0%							Finance
Cost of Money	12	10.0%							Ln. 9 X Ln. 11 + (1 - Ln. 11) X Ln. 10
Cost of Money	13			\$ 100	\$ 82	\$ 64	\$ 46	\$ 28	Ln. 8 X Ln. 12
Income Tax Rate	14	40.0%							Finance
Fraction Equity of COM	15	60.0%							(Ln. 12 - (Ln. 9 X Ln. 11)) / Ln. 12
Cost of Equity	16			\$ 60	\$ 49	\$ 38	\$ 28	\$ 17	Ln. 13 X Ln. 15
Taxable Income Required	17			\$ 100	\$ 82	\$ 64	\$ 46	\$ 28	Ln. 16 / (1 - Ln. 14)
Income Tax Expense	18			\$ 40	\$ 33	\$ 26	\$ 18	\$ 11	Ln. 14 X Ln. 17
Present Worth Factors	19			0.909	0.826	0.751	0.683	0.621	1 / (1 + Ln. 12) ^ Year
Present Worths									
Depreciation	20			\$ 164	\$ 149	\$ 135	\$ 123	\$ 112	Ln. 6 X Ln. 19
Cost of Money	21			\$ 91	\$ 68	\$ 48	\$ 31	\$ 17	Ln. 13 X Ln. 19
Income Taxes	22			\$ 36	\$ 27	\$ 19	\$ 13	\$ 7	Ln. 18 X Ln. 19
Sum of Present Worths									
Depreciation	23	\$ 682							Sum of Ln. 20
Cost of Money	24	\$ 256							Sum of Ln. 21
Income Taxes	25	\$ 102							Sum of Ln. 22
Annuity Factor	26	0.264							1 / Sum of Ln. 19
Levelized Capital Costs									
Depreciation	27	\$ 180							Ln. 23 X Ln. 26
Cost of Money	28	\$ 67							Ln. 24 X Ln. 26
Income Taxes	29	\$ 27							Ln. 25 X Ln. 26
Capital Cost Factors									
Depreciation	30	18.0%							Ln. 27 / Ln. 1
Cost of Money	31	6.7%							Ln. 28 / Ln. 1
Income Taxes	32	2.7%							Ln. 29 / Ln. 1

NS% - Net Salvage %

S.L. - Service Life

## **Investment Loadings**

### **9.1 Definition of Investment Loadings**

In performing unbundled network element cost studies, much of the effort goes to computing the *primary plant construction costs*. These include material costs of major equipment components, vendor engineering and installation labor costs, and others. The studies also focus on the *primary plant accounts*, such as cable and wire facilities, central office switching and central office transmission. A significant portion of the investment necessary to provide network elements is attributable to other construction costs, such as sales taxes, telco engineering and labor, miscellaneous materials, power equipment and buildings. These construction costs typically are included in the cost study by using *investment loading factors*.

Investment loading factors represent the ratio of these additional costs to the primary plant construction costs, such as the ratio of power equipment cost for switching systems to the cost of the switching system itself. Another investment loading for buildings is the ratio of investment in network buildings to the total investment in switching, circuit and other equipment housed in the buildings. They are used to estimate the additional plant investment required to provide network elements and are introduced in the study in ACES.

### **9.2 Description**

Seven investment loading factors are used in the unbundled network element cost studies. The factors are based on special studies of financial and engineering records and vary by state. Each factor is briefly described below.

- *Ratio of material to total EF&I and sales tax factor.* These two factors are used to compute sales taxes on central office switching, central office transmission, operator systems and general purpose computers. The first factor is applied to vendor charges for plant, including vendor engineering and labor, to estimate the cost of materials on which sales taxes apply. The factors are based on a special study of actual vendor material purchases during the most recent three year period and sales taxes paid in the previous year.
- *Telco engineering and plant labor factors.* These factors are used to compute the additional investment required for Southwestern Bell's engineering and labor in constructing central office switching, central office transmission and general purpose computer plant. The factors are based on special studies for the most recent three year period.
- *Sundry & miscellaneous factor.* This factor accounts for interest during construction, contracted labor and other miscellaneous costs in placing central office switching, central office transmission and general purpose computers. As with the previous factors, this factor is based on a study of financial records during a recent three year period.

- *Power equipment factor.* The power equipment factor is used to compute the costs of electrical equipment, such as generators, batteries, etc., needed to operate central office switching, central office transmission, general purpose computers and operator systems. It is based on an analysis of power equipment and costs in the Separations regulatory accounting process.
- *Building factor.* Building factors are used to calculate the forward-looking investment in building space needed for central office switching, transmission and operator systems equipment. The factors are based on the ratio of the current cost of network buildings to the current cost of switching, circuit and operator systems.

### 9.3 Inflation Factors

Unbundled network element costs reflect telephone plant investment and operating expenses assuming forward-looking network technologies, construction costs and operating labor costs. Material, labor and other cost data used in the cost analysis, though, reflect recent and current price levels during the 1995 - 1996 timeframe. Inflation factors are used to reflect inflation in prices from 1995 - 1996 to the present and, if appropriate, to the mid-point of a future planning period. In most states, Southwestern Bell cost studies reflect costs during a 1996 - 1998 planning period. Inflation factors of slightly more than one percent for plant and capital costs, and between three and four percent for operating expenses, are used to compute costs for this time period.

## **Operating Expense Factors**

### **10.1 Definition of Operating Expenses**

Operating expenses are the *recurring* and *non-recurring* plant specific and plant non-specific costs attributable to a network element. Recurring expenses are computed using operating expense factors applied to network element investments, although recurring expenses may be computed based on special studies of recurring work activities and associated costs. Non-recurring operating expenses, which typically include service order and service activation costs, are computed based on studies of work activities and costs.

### **10.2 Description of Operating Expense Factors**

There are *four* operating expense factors used in cost studies.

- *Maintenance factor.* The maintenance factor includes *plant specific* expenses for a type of plant (expenses of maintaining, repairing and rearranging telephone plant in service), power expense, and testing expense. Special studies are performed to identify the portions of power and testing expenses attributable to switching, circuit, cable and wire, and other types of plant. Maintenance factors vary by plant account recognizing, for example, that aerial and underground cable have different maintenance requirements and costs.

The maintenance factors are computed as the ratio of prior year maintenance expenses to average book investment, *adjusted to a current cost basis*. Current cost to book cost ratios are used to express plant investments in terms of current costs. Maintenance factor studies are performed annually using information from Southwestern Bell financial accounting systems.

- *Support asset expense factor.* This factor is used to compute network element *plant non-specific expenses*, such as network administration, plant operations administration and engineering expenses, and *support asset costs* attributable to the network element. There are separate expense factors for central office switching, central office transmission, cable and wire facilities, public telephone and other terminal equipment. The factor is based on the ratio of support asset expenses during the previous year to average plant investment, *adjusted to a current cost basis*.
- *Miscellaneous expense factor.* A single factor is applied to all plant types to compute miscellaneous expenses for property taxes, franchise taxes and other operating taxes. The factor also is referred to as the *ad valorem tax factor*.
- *Commission assessment.* This factor is used to compute the expenses for other operating taxes in account 7240.23. The factor is developed as the ratio of expenses in this account to intrastate operating revenues (less the expense amount). The commission assessment is

used to "gross-up" the total of network element capital costs and operating expenses by an amount sufficient to recover the revenue-related other operating expenses.

The operating expense factors are entered in ACES and used to calculate recurring operating expenses. (See Section 3.11.)

## Forward-Looking Common Costs

### 11.1 Definition of Forward-Looking Common Costs

The total element long run incremental costs of network elements include only costs directly attributable to the individual network elements. There are substantial resources and business activities which are not directly attributable to a single network element, but rather are common to network elements. The costs of these resources and activities also must be recovered for the business to sustain itself. In its Order, the FCC recognized the need for unbundled network element prices to recover a "reasonable allocation" of *forward-looking common costs* which it defined as,

"economic costs efficiently incurred in providing a group of elements or services which may include all elements or services provided by the incumbent LEC that cannot be attributed directly to individual elements or services."<sup>6</sup>

The FCC also indicated forward-looking common costs are to exclude retail costs. Southwestern Bell's methodology for computing these costs described in the next section is consistent with the FCC's definition and requirements for a reasonable allocation of common costs.

### 11.2 Common Cost Calculation and Allocation

The forward-looking common cost study computes a *common cost allocator* which is multiplied times each network element's TELRIC to calculate the amount of common costs to be attributed to the network element. The common cost allocator is the *ratio of common costs to total expenses*.

More precisely, the allocator equals total common costs, less common costs allocable to the retail business, divided by total operating expenses excluding the total common costs. When applied to network element costs, excluding common costs, it provides a reasonable allocation of common costs allocable to wholesale operations.

The steps in the study are as follows:

- *Accumulate Total Common Costs.* Corporate operations expenses for 1995 are totaled. These include total expenses in accounts 6711, 6712 and 6721 - 6728. The costs of support assets used by employees whose salaries appear in the Corporate operations expense accounts are added to this amount.
- *Compute Retail Portion of Total Expense.* A special study is performed to identify the expenses of retail activities included in the marketing and services accounts (6610 and 6620). Retail marketing and services expenses are expressed as a ratio of total expenses to

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<sup>6</sup> FCC Order, paragraph 51.505 (c), Appendix B, page B-30.

determine the relative proportion of total expense attributable to retail marketing and service activity.

- *Exclude Common Costs Allocable to Retail.* The ratio computed in the preceding step is applied to total common costs to remove the portion of common costs allocable to retailing activities.
- *Add General Supervision of Plant Operations Administration and Wholesale Marketing and Services.* Expenses in account 6534.2 and the residual, wholesale portion of accounts 6610 and 6620 are added to wholesale common costs. The resulting total common cost then is "grossed-up" for the Commission assessment.
- *Adjust Total Expenses to Remove Common Costs, Marketing and Services Expenses.* The amounts in accounts 6610, 6620, 6534.2, 6711, 6712, and 6721 - 6728 are subtracted from total expenses.
- *Apply Inflation Factors.* An inflation factor is applied to both common costs and the adjusted total expenses.
- *Compute Common Cost Fixed Allocator.* The last step is to compute the ratio of common costs to the adjusted total expenses.

## **Appendix A: Summary of Unbundled Network Element Cost Studies - Oklahoma<sup>17</sup>**

### **A.1 Unbundled Local Loop Costs**

- A.11 8dB Loop - Two Wire and Four Wire
- A.12 Basic Rate Interface Loop
- A.13 DS1 Loop
- A.14 Unbundled Local Loop dB Loss Conditioning
- A.15 Network Interface Device Non-Recurring Costs
- A.16 Loop Cross-Connects

### **A.2 End Office Switching Costs**

- A.21 Usage
- A.22 Analog Line-Side Port
- A.23 Basic Rate Interface Port
- A.24 Primary Rate Interface Port
- A.25 Two-Wire Analog Trunk Port (Direct Inward Dial)
- A.26 DS1 Trunk

### **A.3 Transport Costs**

- A.31 Dedicated Transport
  - A.311 Entrance Facilities
  - A.312 Interoffice Facilities
  - A.313 Other Transport Network Elements

### **A.32 Common Transport**

### **A.4 Operator Services Costs**

- A.41 Operator Work Seconds
- A.42 Directory Assistance
- A.43 Local and IntraLATA Operator Assistance - Fully Automated Call
- A.44 Call Trace
- A.45 External Rating / Reference for Facility - Based Providers
- A.46 Branding for Facility - Based Providers Directory Assistance Call Completion
- A.47 Directory Assistance Call Completion

### **A.5 Tandem Switching Costs**

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<sup>17</sup> Note: studies include both recurring and non-recurring costs, as appropriate.

A.6 Signaling System 7 (SS7) Costs

- A.61 SS7 Transport
- A.62 Signal Transfer Point (STP) Port
- A.63 Line Information Data Base (LIDB) Query
- A.64 Calling Name Query
- A.65 Toll Free Query (including Query Additive)
- A.66 Local Service Provider to SS7 STP Cross-Connect
- A.67 LIBD / Service Management System (SMS) Costs

A.6 Feature Non-Recurring Cost Studies (of various types)

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OFFICE OF THE SECRETARY

# **Southwestern Bell Telephone Cost Studies**

**Department of Justice Presentation  
November 19, 1997**

# Types of Cost Studies

- what did it cost...?  
(embedded cost)
- what does it cost...?  
(forward-looking cost)
- what might it cost...?  
(speculative cost)

SWBT studies answer the second question.

Most of the contention is not about the accuracy of the results but that the standard should be “what might it cost?”

# **Reasons to Minimize Speculation**

- to promote market via a regulatory processes
- the need for verification
- asymmetric risk-bearing if speculations are wrong (speculative cost reductions that are not achievable mean that SWBT fails to earn a reasonable profit)
- to avoid “cost squeeze” produced by actual incremental cost standard for retail services and speculative cost standard for UNEs

# **SWBT TELRIC Studies**

- T: the total demand is used as the increment in the cost studies
- E: costs calculated for network elements attribute costs to elements to the extent possible
- LR: long-run conditions apply - all inputs are considered variable
- C: costs are estimates of the costs SWBT incurs on a going forward basis

# TELRIC vs. Embedded Cost

Topic	Embedded Cost Approach	TELRIC+
type of measure	average cost	incremental - then expressed per unit
common costs	included and allocated	added to TELRIC and allocated
technology	mix of technologies as actually deployed in the network	most efficient currently available network
cost of capital	current, based on net investment, not levelized	forward-looking, levelized
depreciation	regulated (prescribed) life	forward-looking economic

# **Proven and Reliable**

- SWBT has conducted Forward-Looking Long Run Incremental Cost Studies for over 20 years
- SWBT has performed literally thousands of cost studies
- TELRIC Studies for UNEs Build on this Experience with Forward-Looking Cost Studies

# **Straight-Forward and Understandable**

- Investment-based
- Uses forward-looking Annual Cost Factors
- Forward-looking Long Run Incremental Cost

# **Can Be Validated**

- Outside Consultant could Replicate Loop Methodology
- AT&T has agreed to use SWBT Cost Methodology in Oklahoma
- Straight-forward Investment-based approach
- Bellcore Validates the SCIS model to a 1-2% tolerance range

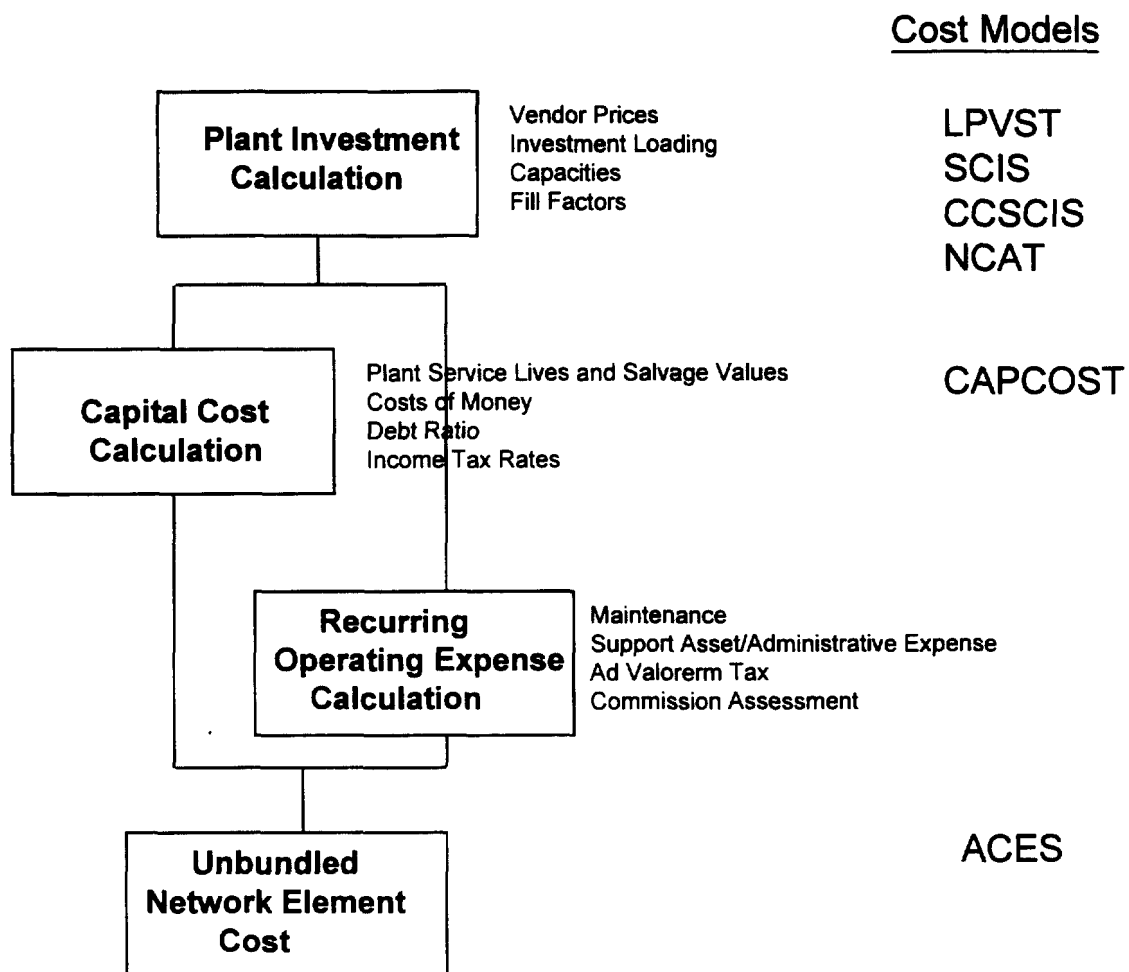
# **Complies with FCC Order**

- **Forward-looking cost over the long run of the total quantity of the facilities and functions. 51.505(b), 679, 685, 690, 691.**
- **Efficient network configuration given existing wire center locations. 51.505(b)(1), 685, 690.**
- **All costs of the entire facility attributed to the greatest extent possible. 682, 691.**
- **Forward-looking cost of capital. 51.505(b)(2).**
- **Economic Depreciation Rates. 51.505(b)(3).**
- **Exclude Embedded Costs, Retail Costs, Opportunity Costs, and Revenues to Subsidize other services. 51.505(d), 691, 692, 704-715.**
- **Per unit cost = total / reasonable projection of the sum of the total number of units that the LEC is likely to provide. 51.511(a), 682**
- **On a flat-rate basis the quantity is the number of elements and on a usage sensitive basis it is unit of measurement of the usage. 51.551(b)**

# **SWBT'S TELRIC Cost Process**

- Identify the Network Investment
- Models specific to the type of investment (not a 'one-size-fits-all approach)
- Apply Investment Factors
- Apply Cost Factors in the ACES model

# Flow of SWBT's Cost Process



# Investment Factors

- **Material to EF&I (to identify portion subject to sales tax)**
  - Used to compute the cost of materials subject to sales tax
- **Sales Tax**
  - Capitalized sales taxes associated with equipment purchases
- **Telco Engineering**
  - Capitalized Southwestern Bell engineering
- **Telco Plant Labor**
  - Capitalized Southwestern Bell installation plant labor
- **Sundry & Miscellaneous**
  - Interest during construction, contracted labor and other capitalized costs
- **Power Investment**
  - Investments for generators, batteries, etc.
- **Building**
  - Building space required for switching, transmission and operator systems equipment.